209. The method of Claim 208 wherein the nanoparticles are metal nanoparticles or semiconductor nanoparticles.

210. The method of Claim 209 wherein the nanoparticles are gold nanoparticles.

211. The method of Claim 208 wherein each of the recognition oligonucleotides comprises a spacer portion and a recognition portion, the spacer portion being designed so that it can bind to the nanoparticles.

212. The method of Claim 211 wherein each of the spacer portions of the recognition oligonucleotides has a moiety covalently bound thereto, the moiety comprising a functional group which can bind to the nanoparticles.

213. The method of Claim 211 wherein the spacer portions of the recognition oligonucleotides comprises at least about 10 nucleotides.

214. The method of Claim 213 wherein the spacer portions of the recognition oligonucleotides comprises from about 10 nucleotides to about 30 nucleotides.

215. The method of Claim 211 wherein the bases of the nucleotides of the spacer are all adenines, all thymines, all cytosines, all uracils or all guanines.

216. The method of Claim 211 wherein the diluent oligonucleotides contain about the same number of nucleotides as are contained in the spacer portions of the recognition oligonucleotides.

217. The method of Claim 216 wherein the sequence of the diluent oligonucleotides is the same as the sequence of the spacer portions of the recognition oligonucleotides.

218. The method of Claim 208 wherein the oligonucleotides comprise at least two types of recognition oligonucleotides.

219. A method of binding oligonucleotides to charged nanoparticles to produce nanoparticle-oligonucleotide conjugates, the method comprising:

providing oligonucleotides having covalently bound thereto a moiety comprising a functional group which can bind to the nanoparticles, the oligonucleotides comprising:

a type of recognition oligonucleotides; and

a type of diluent oligonucleotides;

contacting the oligonucleotides with the nanoparticles in water for a period of time sufficient to allow at least some of each of the types of oligonucleotides to bind to the nanoparticles;

adding at least one salt to the water to form a salt solution, the ionic strength of the salt solution being sufficient to overcome at least partially the electrostatic attraction or repulsion of the oligonucleotides for the nanoparticles and the electrostatic repulsion of the oligonucleotides for each other; and

contacting the oligonucleotides and nanoparticles in the salt solution for an additional period of time sufficient to allow additional oligonucleotides of each of the types of oligonucleotides to bind to the nanoparticles to produce the nanoparticle-oligonucleotide conjugates.

220. The method of Claim 219 wherein the nanoparticles are metal nanoparticles or semiconductor nanoparticles.

221. The method of Claim 220 wherein the nanoparticles are gold nanoparticles.

222. The method of Claim 221 wherein the moiety comprising a functional group which can bind to the nanoparticles is an alkanethiol.

223. The method of Claim 219 wherein all of the salt is added to the water in a single addition.

224. The method of Claim 219 wherein the salt is added gradually over time.

225. The method of Claim 219 wherein the salt is selected from the group consisting of sodium chloride, magnesium chloride, potassium chloride, ammonium, chloride, sodium, acetate, ammonium acetate, a combination of two or more of these salts, one of these salts in a phosphate buffer, and a combination of two or more these salts in a phosphate buffer.

226. The method of Claim 225 wherein the salt is sodium chloride in a phosphate buffer.

227. The method of Claim 219 wherein nanoparticle-oligonucleotide conjugates are produced which have the oligonucleotides are present on surface of the nanoparticles at a surface density of at least 10 picomoles/cm^2.

228. The method of Claim 227 wherein the oligonucleotides are present on surface of the nanoparticles at a surface density of at least 15 picomoles/cm^2.